The Electron Anisotropy Upper Bound: Two-Dimensional Simulations

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If the temperature anisotropy of a plasma species is sufficiently large, the resulting instability leads to enhanced electromagnetic fluctuations which resonantly scatter that species and reduce that anisotropy. If the proton anisotropy is such that $T_{\perp p} > T_{\| p}$, the electromagnetic proton cyclotron anisotropy instability is the source of enhanced fluctuations; both computer simulations and observations in the magnetosheath and outer magnetosphere have shown that this leads to an upper bound on $T_{\perp p}/T_{\| p}$. In an analogous way, $T_{\perp e} > T_{\| e}$ leads to the whistler anisotropy instability which, in turn, leads to enhanced fluctuations which scatter the electrons so as to reduce their temperature anisotropy. However, it has not yet been determined whether this process leads to a clearly identifiable upper bound on $T_{\perp e}/T_{\| e}$. To study this question, we have carried out two-dimensional particle simulations of this instability in a homogeneous system. This presentation will describe results from this study.